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EXAMINER	
CHANG, AUDREY Y	

ART UNIT	PAPER NUMBER
2872	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/500,461	TOMOYOSHI, ITO	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 January 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7,8 and 10-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7,8 and 10-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on January 7, 2008, which has been entered into the file.
- By this amendment, the applicant has amended claims 7, and 10-11, has canceled 1, 4-6, 9 and has newly added claims 12-13.
- Claims 7-8 and 10-13 remain pending in this application.
- The objections to drawings set forth in the previous Office Action are withdrawn in response to applicant's amendment.
- The rejections to claims 7-11 set forth in the previous Office Action are withdrawn in response to applicant's amendment.

Claim Objections

1. **Claim 8 is objected** to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 8 recites that the R, B G and B LEDs are arranged in "proximity" to each other that is not further limiting the claimed feature of the "a first LED ... is disposed in the vicinity of a second LED... a third LED is disposed in the vicinity of the second LED" of the amended independent claim, (claim 7).

2. Claims 12-13 are objected to because of the following informalities:

(1). The claims fail to provide the logical relationships between the "dedicated high-speed parallel distributed process system" and "the plurality of dedicated LSIs" with respect to the rest optical

elements of the device. Since the device is an optical device and these "process system" and "LSIs" do not seem to have any optical functions. It is therefore not clear what are the scopes of these claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 7-8 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kato et al (PN. 5,852,504) in view of the patents issued to Sekiguchi et al (PN. 5,798,864), Popovich et al (PN. 6,115,152) and Eichenlaub (PN.5,410,345).

Kato et al teaches a *holographic image display* that is comprised of a *computer* for calculating phase information from three dimensional coordinate data of *objects* (Figures 1-2) to create *computer generated hologram fringe information* wherein the phase information or computer generated holographic fringe information is provided by a *controller* (138, Figure 28) to a ***reflective*** *spatial light modulator* (130, **Figure 28**) such as a *liquid crystal display device*, (Figure 26, column 12, lines 7-10) to display the computer generated holographic *fringe* information on the ***reflective*** liquid crystal display device. Kato et al teaches that a *semiconductor laser light source* (134) is used to illuminating the reflective liquid crystal display **via** a *half mirror* (142) such that a three dimensional image of the objects, (objects used for calculating the computer generated holographic fringe information) is reconstructed from the reflective liquid crystal display device and is *projected* by the *half mirror* to an observer, (please see

Figure 28, columns 11-12). The data of the three-dimensional object used for creating the computer-generated hologram is externally obtained, (please see Figures 6-7). The controller or the computer is connected to the reflective liquid crystal display, (please see Figure 28).

This reference has met all the limitations of the claims. This reference however does not teach explicitly, with respect to claim 8, to use a pinhole filter and a collimator lens disposed between the light source and the half mirror, however this reference does teach that *collimated* light is used to illuminate the liquid crystal display device. **Kato** et al in a different embodiment teaches that a *pinhole filter* (for creating point light source) and a *collimator lens* (216 or 218, Figure 35) can be used to create *collimated illumination* light beam to illuminate the liquid crystal display device. **Sekiguchi** in the same field of endeavor also teaches to use *pinhole filter* and *collimator lens* (202a, Figure 9) between the laser light source and the half mirror for creating *collimated illumination light beam* for illuminating the display device, for displaying a computer generated Fraunhofer diffraction image (which can be one form of computer generated holographic image). It would then have been obvious to one skilled in the art to apply the teachings to modify the holographic image display device of Sato et al to use pinhole filter and collimator lens to *effectively* create the *collimated* illumination beams needed.

Both Kato et al and **Sekiguchi** teach a *full color display* wherein three light sources each generating one primary color of light are being used to illuminate the display, (please see Figure 36 of Kato et al and Figure 9 of Sekiguchi), which meet the feature "that the parallel light that illuminate the display is formed from three light-emitting diodes emitting three primary light at the same time and the colors of the light incident on the half mirror". The generated three color light beams will incident on the half mirror (142, Figure 28 Kato et al) in the reflective mode. These references teach to use laser light sources but do not teach *explicitly* that the light emitting diodes are used as the light sources. **Kato** et al in fact teaches that the light sources are *semiconductor laser* that emitting red, green or blue light respectively, (please see column 11, lines 40-60), one skilled in the art would understand that a

semiconductor laser **is essentially** a *light emitting diode light sources* for they all based on same semiconductor p-n junction for emitting the light. **Popovich** et al in the same field of endeavor also teaches that either laser diode (semiconductor laser) of light emitting diodes, (LEDs) may be used to illuminate a reflective holographic display to provide the reconstructed full color holographic image, (please see column 21, line 28 to column 22, line 6). It would then have been obvious to one skilled in the art to apply the teachings of **Popovich** et al to modify the display device of **Kato** et al to use high power LEDs as the light sources for producing the full color images for the benefit of using bright light sources with high output power and narrow bandwidth to improve the image quality.

Claim 7 has been amended to include the phrase that the *"LEDs arranged on a two dimensional grid pattern ... wherein a first LED of the R, G, and B LEDs is disposed in the vicinity of a second LED in the horizontal direction and a third LED is disposed in the vicinity of the second LED in the vertical direction orthogonal to the horizontal direction".* **Kato** et al teaches that the three light sources, (for generating red, blue and green light respectively), are arranged in a two-dimensional array manner, (please see Figure 36) each with an associated spatial light modulators. One skilled in the art would understand in order for each of the light beam to illuminate the spatial light modulator (SLM, 200, 202, 204, Figure 36), arranged in *two dimensional manner*, the light sources have to be arranged also in two dimensional manner, (i.e. the semiconductor light sources (206, 208, 210) have to be **aligned** with the optical axes of the SLM respectively), since the collimating light beams from the three light sources will not be able to turn direction by themselves or by SLM to form the orthogonal arranged light beams as they incident on the half mirror. However this reference does not teach that the three color light sources are arranged so that lights are emitted from a plane formed by the two dimensional light sources patterns. But one skilled in the art must understand that since the three primary color lights are used to illuminate the liquid crystal display device to produce full color display. The three color light beams have to be aligned with the arrangement of the color sub-pixels to produce the full color display. As demonstrated

by **Eichenlaub** in a full color image display arrangement, light sources with red LED (174, Figure 13), green LED (175) and blue LED (176 and/or 177) are arranged in a *two dimensional grid pattern* with first LED (such as the blue LED, 177) at vicinity of the second LEDs (green LED 176) in the horizontal direction and a third LED (red LED 174) is at the vicinity of the second LED (green LED 176) at vertical direction, so that the light emitting diodes for the three primary color can be used to illuminate a pixel of the liquid crystal display to produce the full color image display. It would then have been obvious to one skilled in the art to arrange the three color light sources in a grid pattern that matches the pixels on the liquid crystal display for the benefit of using a single LCD display to efficiently illuminate the display to provide full color image display.

With regard to claim 11, it is implicitly true that the size of reconstruction area which is the size of illumination areas of the light sources is determined by the geometric relationship between the pinhole filter, the collimator lens, the display device and the field lens.

5. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Kato et al, Sekiguchi et al, Popovich et al and Eichenlaub (PN.5,410,345) as applied to claim 7 above, and further in view of the patents issued to Fukagawa (PN. 6,510,446) and Ohno (PN. 6,232,940).

The holographic image reproducing device taught by Kato et al in view of the teachings of Sekiguchi et al, Popovich et al and Eichenlaub as described for claim 7 above have met all the limitations of the claims.

Claims 12 and 13 recite a "dedicated high-speed parallel distributed processing system" and " a plurality of dedicated Large Scale Integrator LSIs", but fail to provide the logical relationships of these elements with the holographic reproducing device. *These elements are therefore being examined as data processing element and liquid crystal driving circuit.* Kato et al teaches to use computer for processing

and calculate computer hologram data but it does not teach explicitly to use the cited processor. Fukagawa teaches that a dedicated high speed data calculation processor can be used to calculate image data, (please see column 16, lines 49-52). Kato et al teaches that the display is a liquid crystal display device but does not teach explicitly that it is controlled and driven by a plurality of LSIs. **Ohno** in the same field of endeavor teach that a standard liquid crystal display device is driven by having a plurality of parallel LSIs (21-23, Figure 6) with a shared memory 20a, Figure 4). It would then have been obvious to one skilled in the art to apply the teachings of Fukagawa et al to adopt the high speed processor to processing the image data and to use standard LCD display with the plurality of LSIs to improve the data processing speed and to (if is not already implicitly included) improve the control of the liquid crystal display device for improving the image quality.

Response to Arguments

6. Applicant's arguments filed January 7, 2008 have been fully considered but they are not persuasive. The newly amended and newly added claims have been fully considered and are rejected for the reasons stated above.

7. In response to applicant's arguments which state that the cited Eichenlaub does not teach the LED grid arrangement of the claim 7 of instant application and are "teaching away" from the arrangement recited in claim 7, the examiner respectfully disagrees, since applicant fails to point out explicitly what is the difference. In fact, as explicitly stated in the reasons for rejection above, the grid pattern of Eichenlaub is exactly the same as the grid pattern recited in claim 7. There is no teaching away from the pattern claimed in the instant application. Also, the grid pattern of the LEDs taught by Eichenlaub can be used with the display arrangement of Kato et al shown in Figure 28 to provide full color holographic display and to reduce the number of LCD used. The combination will be highly motivated.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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